DOCUMENT RESUME

ED 248 126 SE 044 776

AUTHOR Landreman, Dolores M.
TITLE Proposal Guide. Guide for the Preparation of Proposals for Science Student Research Projects.
INSTITUTION Ohio Academy of Science, Columbus.
PUB DATE 80
NOTE 17p.
AVAILABLE FROM The Ohio Academy of Science, 445 King Avenue, Columbus, OH 43201 ($3.00 per copy).
PUB TYPE Guides - Classroom Use - Materials (For Learner) (051)

EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS *Research Proposals; Science Education; *Science Projects; Secondary Education; *Secondary School Science; *Student Projects; *Student Research

ABSTRACT

Organizations such as the Ohio Academy of Science sponsor programs to encourage junior and senior high school students to conduct science projects. These programs are designed to give students who might pursue careers in technical areas a realistic foretaste of some of their future professional responsibilities, including the effective communication of technical information. This guide has been prepared to help students learn about technical proposals and to assist them in preparing proposals for research grants which are made available by the American Association for the Advancement of Science and other sponsors through the Ohio Academy of Science. The guide is divided into three major parts. The first part discusses the nature of a technical proposal. The second part discusses the content of a student proposal. Proposal content includes: objective(s); background information; description of experimental work; significance of anticipated work; and itemized budget. The third part presents a sample format for a proposal and the transmittal letter which must accompany the proposal. (JN)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED248126

PROPOSAL GUIDE

GUIDE FOR THE PREPARATION OF PROPOSALS FOR SCIENCE STUDENT RESEARCH PROJECTS

Prepared for
The Ohio Academy of Science

by Dolores M. Landreman

Senior Proposal Specialist
Battelle Memorial Institute
Columbus Laboratories

SE044776

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

✓ This document has been reproduced as received from the person or organization originating it.
Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL IN MICROFICHE ONLY HAS BEEN GRANTED BY

Lynn Edward Elfner

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Acknowledgements

Lynn Edward Elfner
Executive Officer

The Ohio Academy of Science is grateful to Dolores M. Landreman of Battelle Memorial Institute for her latest contribution to the development of technical communications. Her first work for us, *The Technical Writing Style Guide*, published in 1966, has been a model for other states and an excellent tool for improvement of technical writing among students in Ohio schools. With this *Proposal Guide* we are sure she has created another winner. As a former English teacher and now as a Senior Proposal Specialist at Battelle, she blends the knowledge of classroom experience and an interest in young people with the daily business of sponsored research. She is keenly aware that the technical proposal is at the heart of the advancement of science, engineering and technology. Proposal development skills are of lifetime service no matter what profession a student may pursue. All science academies need someone like Dolores Landreman; we are fortunate to receive the benefits of her excellent work.

No project of this nature would be complete without the support of generous sponsors. Accordingly, we acknowledge with sincere thanks the support provided from the following whose gifts have enabled the Academy to publish this guide. We appreciate your interest in the youth of Ohio:

The American Association for The Advancement Of Science
The American Cancer Society, Ohio Division
Goodyear Aerospace Corporation
Ohio Dental Association
Ohio Osteopathic Association
The Ohio Veterinary Medical Association
The Timken Company

Copyright © 1980 by The Ohio Academy of Science, 445 King Avenue
Columbus, Ohio 43201

To Students and Teachers

Programs sponsored by such organizations as the Ohio Academy of Science to encourage junior and senior high school students to conduct science projects are designed to give students who might pursue careers in technical areas a realistic foretaste of some of their future professional responsibilities. **Clearly, the effective communication of technical information will be among their greatest challenges.** This *Guide* has been prepared to help students learn about a very important type of technical document — **the technical proposal.** It has also been prepared to assist students in their preparation of proposals for research grants which are made available by the American Association for the Advancement of Science and other sponsors through the Ohio Academy of Science. Student members of the Academy in grades 7 through 12 are eligible to apply for funds to support research projects they would like to undertake.

A research grants program has been maintained for many years by the Ohio Academy of Science, and hundreds of grants have been made. Although most of the grants have been small, they have provided an important stimulus for some exciting projects that have yielded worthwhile results.

To become eligible for such a research grant, a student planning a project during the school year must submit six copies of his or her proposal before the specified deadline, with a transmittal letter to:

The Ohio Academy of Science
Attn: Chairman, Student Research Grants Committee
445 King Avenue
Columbus, Ohio 43201

A specific deadline is established each year; the date proposals are due and any other needed information can be obtained from the Academy's office.

Grants are intended primarily to cover expendable materials and supplies and do not cover travel. Materials that may be purchased with grant funds include laboratory equipment, chemicals, maps, and other such items. The cost of duplicating the final report to be submitted to the Academy at the conclusion of the project is also covered.

Students are encouraged to ask their English or science teachers or their school librarians to obtain copies of the *Technical Writing Style Guide* which is available from the Academy. That *Guide* emphasizes report preparation. However, it contains much information that will also be helpful to students as they prepare their proposals.

This *Guide* for the preparation of proposals is divided into three major parts:

- **What is a Technical Proposal?**
- **Content of Student Proposals**
- **Sample Format for Student Proposals**

4

What Is a Technical Proposal?

A technical proposal is an offer to do a specific technical task — for example, to conduct a needed analytical study or an experiment. It can be written or oral, formal or informal, solicited or unsolicited, competitive or noncompetitive, very brief or in many volumes.

A proposal might be prepared at the request of someone with a technical problem that must be solved — such as the supervisor of a laboratory, the president of a company, or the head of a government agency. Such a proposal is frequently called "solicited".

Or, a proposal might be prepared by someone with an idea for solving some problem. Such a proposal is called "unsolicited". An unsolicited proposal would be submitted to someone (or some organization) who has the money to support the necessary work and who would benefit if the project came to a successful conclusion.

All proposals contain several basic elements. And all proposals must be written clearly and convincingly so that those responsible for allocating the money sought can make decisions with confidence. Decisions must be made concerning such things as the potential value of the results, whether the person proposing to do the work really understands the problem, whether he or she is competent to do the work, whether the cost estimates are realistic, and what the chances are that the work will be completed on schedule.

In one form or another, all proposals must contain — either directly or by implication or reference — the following information:

- The nature of the problem to be attacked — what is known and what is unknown.
- The anticipated outcome of the proposed work — a definitive report? a working model? drawings and specifications for new equipment? recommendations for the next phase of the work?
- The procedure to be used
- The equipment and other materials needed for the work
- The schedule of the work and the expected time of completion
- The qualifications of the person or persons who will do the work
- The anticipated cost of the project.

Before the project is started, the proposed work must be approved by someone who has the authority to do so.

The brief dialog below illustrates a very simple informal, oral, solicited, noncompetitive proposal situation:

Request for Proposal:

Supervisor — *Mike, can you find out why the No. 6 machine has been making so much noise lately? Do you think you could have it fixed before we start work next Monday?*

Proposal:

Mike: *I've noticed that noise, too. Might be a danger signal. We certainly should get rid of it. I think we'll have to take the machine apart — at least some of it — so we can check the internal mechanisms. I'll need a machinist, an electrician, and a welder to help me. We'll probably have to buy some new valves or pulleys. If we're going to have it ready by Monday, that'll mean overtime pay. My estimate is that we'll need about $250 in equipment and about $400 overtime pay. O.K.?*

Authorization:

Supervisor: *O.K. But, if it looks as though expenses might be much much more than that, call me. It might be cheaper, in the long run, to buy a new machine.*

Although Mike and his supervisor had only a short conversation, they both have a definite understanding of the problem, the objective, the procedure, the materials needed, the schedule and time of completion, who will be responsible for management of the work, the qualifications of the workers, and the probable cost of the job. In other words, Mike's proposal was a good one: it made it easy for his supervisor to reach a decision with confidence.

Students sometimes make simple proposals covering extra credit work for their science courses or related to their extracurricular activities. For example, at homecoming time students sometimes submit proposals to local businessmen concerning support they need (money or materials) for the floats their clubs want to enter in the homecoming parade.

You can imagine that the preparation of large, complex proposals by industrial organizations would be quite challenging — such as competing proposals prepared by several automobile manufacturers seeking U.S. Department of Transportation funds for the design and construction of a radically different experimental automobile that would be safer and use less energy. Such large proposals are usually put together by teams of technical experts and communication specialists. The teams might include scientists, engineers, economists, computer specialists, technical writers and editors, artists, draftsmen, and many others.

6

Content of Student Proposals

Proposals submitted to the Student Research Grants Committee should be formal written proposals. The title should be brief and reflect the purpose of the proposed project.

The transmittal letter should state the title of the project and the total amount of grant being requested. It should also state the names of the supervising science teacher and the English teacher who will serve as reporting advisor. The following should be provided:

Proposal Contents:

1. Objective(s)
2. Background information, including previous findings of others
3. Description of the experimental work, including methods, equipment, and how results will be evaluated
4. Significance of the anticipated results.
5. Itemized budget

Attachment:

1. Letter of evaluation with or without a recommendation from a teacher other than the supervising science teacher.

Be particularly careful in wording your objectives. They must relate to the *end product* of the research — the outcome. For example, "to investigate" or "to study" something is not a proper objective. Appropriate words such as *establish, determine, define, compare, confirm, verify* should be used.

As you write your proposal, think of yourself as a professional scientist or engineer who must be *convincing* about the *benefits* to be derived from your project — benefits in which the Ohio Academy of Science is interested: new information, new insights about old information, additional controlled demonstration of important physical phenomena, and the like. Also as you write, envision your final report to the Academy. What will it contain? Should you plan to make photographs during the experiments for inclusion in the report?

Sometimes in scientific research projects it is not possible to achieve the results anticipated. Surprising things sometimes happen. That's what makes research so exciting. If results are different from those expected, the researcher must report honestly just how much it was possible to achieve or learn. If things went wrong, the researcher must say so and try to provide an explanation or a reasonably realistic speculation. Might a control instrument have malfunctioned? Might a contaminant have been introduced? *The important thing is to be accurate in reporting results.* Reliable information will provide a good base for the next person who tries to solve the problem.

The following sample format for the transmittal letter and the proposal are provided only as general guides — the formats need not be followed exactly. However, all necessary information must be included.

SAMPLE TRANSMITTAL LETTER

(USE SCHOOL LETTERHEAD STATIONERY)

September 15, 19xx

The Ohio Academy of Science
Attn: Chairman, Student Research Grants Committee
445 King Avenue
Columbus, Ohio 43201

Gentlemen:

Request for Student Grant

Proposed Project: BRIEF TITLE REFLECTING ANTICIPATED RESULTS

Enclosed are six copies of my proposal to conduct a study concerning _____ _____ under a grant from the Ohio Academy of Science. I am a junior in Central City High School. My research supervisor will be M_____. My English advisor will be M_____ _____. The total of my grant request is $_____.

I will greatly appreciate your favorable consideration of my proposal, and I agree to submit a report on my research results to the Academy within one year of the date of funding. If you have any questions you can reach me at school or at my home, 4455 Kendall Avenue, Central City, Ohio, 43XIY My home telephone number is (61X) 267-2484.

Very truly yours,

George M. Smithman

Enclosures: Proposal (6 copies)
Project Evaluation

8

SAMPLE PROPOSAL

PROPOSED RESEARCH PROJECT

ON

BRIEF TITLE REFLECTING ANTICIPATED RESULTS

to

The Ohio Academy of Science

by

George M. Smithman
4455 Kendall Avenue
Central City, Ohio 43X1X
Telephone: (61X) 267-2484

September 15, 19xx

Research Supervisor: M_____

English Advisor: M_____

Central City High School
462 Main Street
Central City, Ohio 43X1X

CONTENTS

	Page
Abstract (or Summary)	ii
Introduction	1
Objective	x
Technical Background	x
Proposed Approach	x
Planned Procedure	x
Description of Equipment	x
Method of Evaluating Results	x
Significance of Anticipated Results	x
Budget	x
Qualifications for Conducting the Project	x
References	x
Figures:	
Figure 1 - Project Schedule	x
Figure 2 - Sketch of Research Equipment To Be Constructed	x
Tables:	
Table 1 - Samples To Be Tested	x
Table 2 - Project Budget Breakdown	x

ABSTRACT

An Abstract (or Summary) of about 200 words should be provided. It should be on a separate sheet of paper, immediately after the Table of Contents.

PROPOSED RESEARCH PROJECT

ON

BRIEF TITLE REFLECTING ANTICIPATED RESULTS

Introduction

The Introduction should state explicitly what is being proposed. Some background information might be included as well as a brief statement concerning your qualifications for doing the work. The benefits to be derived from the research should be highlighted.

The Introduction should be written persuasively. It must favorably impress those who must judge whether the project is worthy of support. The rest of the proposal is an elaboration of the points made in the Introduction.

Objective

The objective should be stated as precisely and as concretely as possible. If there are subobjectives, it might be best to list them in order of importance. The specific form of the expected outcome of the work should be stated. In addition to the written report to the Academy, will there be, perhaps, a working model? A demonstration to your school's science club? A display at a Science Day program?

Technical Background

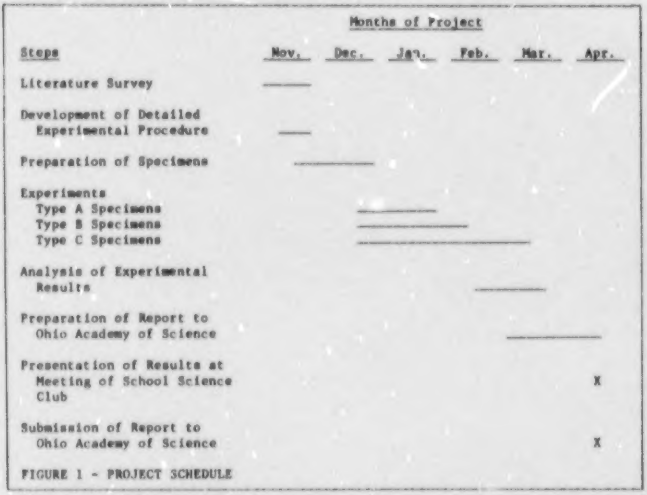
This section should give all the detailed information necessary for understanding why the proposed research is important. It should include a brief discussion of what has been done previously by others. It should prepare the readers to appreciate why you have selected the approach that you will describe next. Any alternative approaches that you have considered and rejected should be mentioned, with the reasons for your rejection (e.g., too costly?). If you made a literature search, references should be included[1].

Proposed Approach

The introductory paragraph in this section should give a general description of the approach you have selected. For example, will it be experimental or analytical? Both? What assumptions are you making? How important is control to ensure accuracy of data?

Planned Procedure

Tell exactly how you will conduct the project. If appropriate, list steps or phases. Give a brief schedule; something like the one shown in Figure 1 might be suitable.



Steps	Months of Project: Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
Literature Survey	———					
Development of Detailed Experimental Procedure	——					
Preparation of Specimens	————					
Experiments						
Type A Specimens		————				
Type B Specimens		—————				
Type C Specimens		———————				
Analysis of Experimental Results				————		
Preparation of Report to Ohio Academy of Science					————	
Presentation of Results at Meeting of School Science Club						X
Submission of Report to Ohio Academy of Science						X

FIGURE 1 - PROJECT SCHEDULE

You might also include a table listing, for example, the samples that you intend to test. Table 1 below is a good pattern for a simple table.

TABLE 1 - SAMPLES TO BE TESTED

Sample	Number	Characteristics
Type A	6	xxxxxxxxxx
Type B	12	nnnnnnnnnn
Type C	24	yyyyyyyyyyyyyyyyyyyyyyyy

Description of Equipment

Any equipment you intend to borrow, purchase, or build should be described. Perhaps a sketch or two would help you to describe it (see Figure 2).

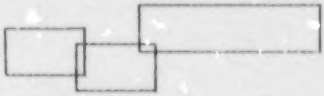


FIGURE 2. SKETCH OF RESEARCH EQUIPMENT TO BE CONSTRUCTED

Method of Evaluating Results

This section should tell how you plan to evaluate the results you obtain. For example, will you make comparisons with some standard?

Significance of Anticipated Results

What benefits will be derived as the result of your work? Will you have proved something? Will others be able to build on your work?

Budget

Your budget should be given in suitable detail; major equipment or supply needs must be itemized. Table 2 illustrates how you might present your budget.

TABLE 2 - PROJECT BUDGET BREAKDOWN

Materials for Construction of Laboratory Equipment		$ xx
Item 1 - $x		
Item 2 - $x		
Samples		
Types A and B @ $x per lb.		xx
Types C @ $x per lb.		x
Postage and supplies for survey		xx
Cost of Report Duplication		x
	Total	$ xx

Qualifications for Conducting

The Project

In this section you should give more information about yourself to help the Committee judge how well prepared you are to do the work you propose. For example, have you taken all the mathematics courses required for handling any statistical aspects of the work? Did you conduct a related experiment last year? Did you have a summer job that gave you some valuable insights into the problem? Are you planning your college-preparation studies to emphasize this technical area?

References

(1) Any consistent pattern of literature citation approved by your English teacher will be satisfactory. You might like to check various scientific publications to see what patterns are used in them. Also, see the Technical Writing Style Guide which is available from the Ohio Academy of Science.

Some examples are provided below:

(1) Cook, Desmond L., Program Evaluation and Review Technique, Applications in Education, U. S. Government Printing Office, Washington, D. C., No. FS5.212.12024, 1971.

(2) Lesikar, Raymond V., How to Write a Report Your Boss Will Read and Remember, Dow Jones-Irwin, Inc., Homewood, Ill., 1974.

(3) Bacon, F. T., "Alkaline Primary Cells", U. S. Patent 2,716,670, August 30, 1955.

(4) Greenberg, Joel, "Are Psychiatrists Biased?", Science News, Vol. 118, No. 2, July 12, 1980, p. 29.

The difference between the right word and the almost-right word is the difference between the lightning and the lightning bug.

Mark Twain

There is nothing so powerful as truth, — and often nothing so strange.

Daniel Webster

The Ohio Academy of Science
445 King Avenue
Columbus, Ohio 43201